

# Performance meets Sustainability

Binders and additives for advanced nonwovens



 **BASF**

We create chemistry

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## Creating chemistry for innovative nonwovens



The world of applications in which binders and additives for nonwovens are required is as varied as the world we live in: from the automotive industry to the construction industry; from glass fibers to natural fibers. This makes it even more important to be aware of what our different customers expect and to understand the challenges posed by each industry.

At BASF, we see ourselves as your committed partner dedicated to the development of advanced binders and additives for nonwoven applications. With us, high technical expertise comes together with tailor-made and more sustainable solutions. To provide you with exactly the right solutions for your needs, we have classified our brands according to sustainability and performance aspects. This classification gives you guidance on how to combine business success with environmental and social requirements. Let us make a joint effort to grow together.

Yours sincerely

Dr. Thorsten Habeck, Business Director Fiber Bonding Europe,  
Middle East & Africa

# Sustainable development of nonwovens

Today, nonwovens are expected to provide increasingly high performance while saving cost and energy in processing and use. Producers and consumers are looking for safe and health-compatible products.



We at BASF are well aware of the key issues for nonwovens applications. For us, sustainability is more than just a trend – it is a core principle of our daily work. We strive to achieve a balance between the three dimensions of sustainable development – economy, environment and society.

By using the standardized Sustainable Solution Steering Method\*, we assess the sustainability contribution of each of our products and systematically steer our portfolio towards more efficient solutions. No matter which aspect is important to you, with our products you can benefit from first-mover advantage.

## Low-emissions

We develop formulation additives and binders with minimized volatile organic compounds (VOCs). This improves occupational safety and enables health-compatible nonwovens.

## Low system costs

We contribute to reducing your system costs without impact on performance, for example through lower drying temperatures or more efficient binders for various fiber types.

## Biobased raw materials

BASF's mass balance approach allows you to derive our products from renewable feedstock. This way you can save fossil resources and reduce greenhouse gas emissions.

## Eco-efficiency

To track products from cradle to grave you can use our eco-efficiency analysis. The purpose of this tool is to harmonize economy and ecology. This helps you to optimize your portfolio.



# Solutions for the Automotive industry

In BASF you have a dedicated partner in your value chain to meet the increasing demands of the globalized automotive industry.

**Engine Filters**  
Acronal®, Acrodur®  
Page 15

**Seating**  
Acrodur®  
Page 17

**Roof frame**  
Acrodur®  
Page 17

**Door trim**  
Acrodur®  
Page 17

**Carpet**  
Acronal®, Styrofan®  
Page 19

## Lightweight components

Our Acrodur® grades enable cost-efficient sustainable lightweight components based on natural fiber composites. This contributes to save fuel and reduce CO<sub>2</sub> emissions.

## Improved cost efficiency

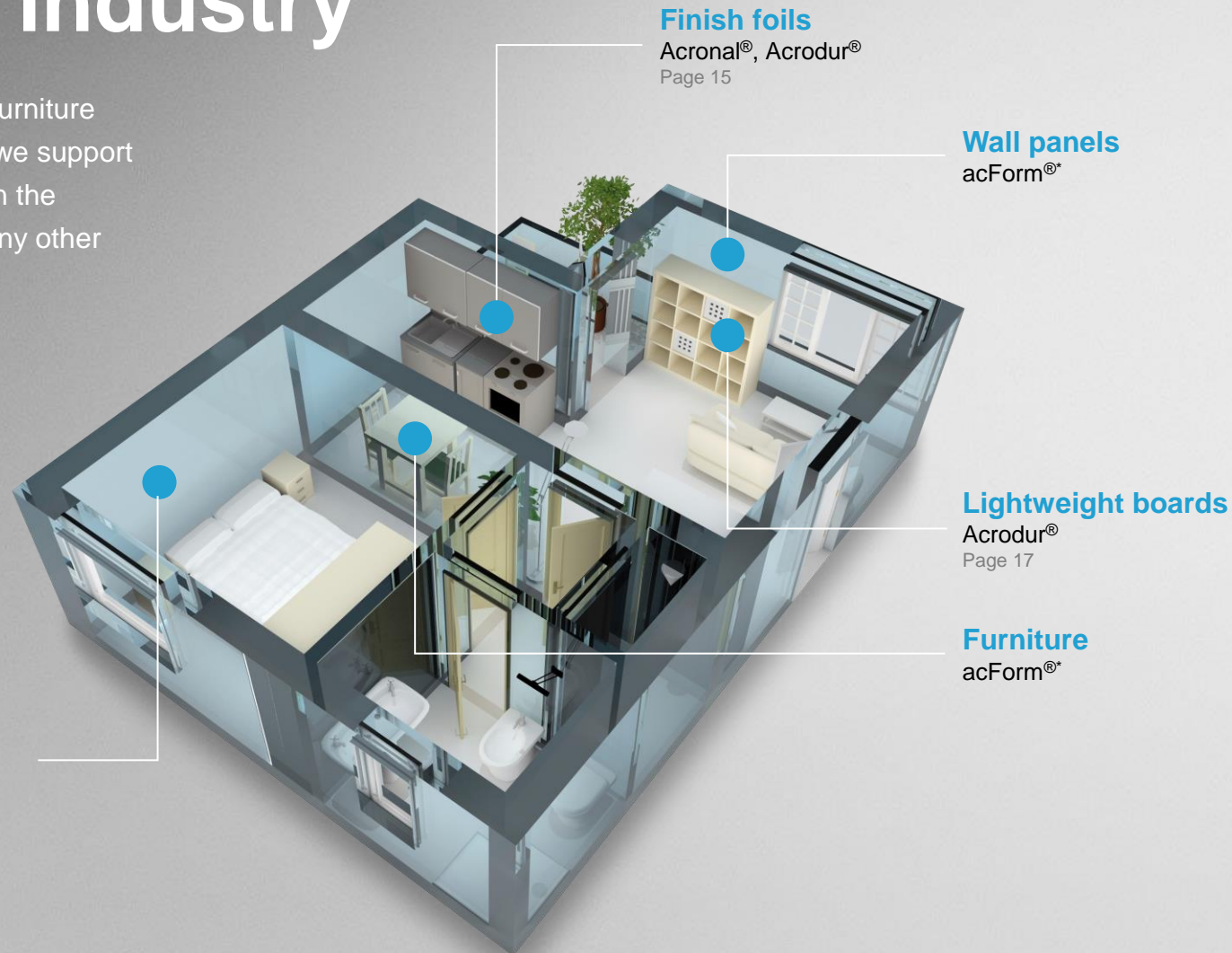
Our solutions help you optimize your system and process costs, for instance by reducing the number of steps needed in the manufacturing process.

## Low emissions

BASF has developed low-emission binders with minimized volatile organic compounds (VOCs) and a low odor level.

# Solutions for the Furniture industry

As an established partner for furniture manufacturers and suppliers, we support you with innovative solutions in the production of furniture and many other interior applications.



**Wall coverings**  
Acronal®  
Page 15

**Finish foils**  
Acronal®, Acrodur®  
Page 15

**Wall panels**  
acForm®\*

**Lightweight boards**  
Acrodur®  
Page 17

**Furniture**  
acForm®\*

## Greater design opportunities

Our binders shape natural fiber composites and allow to manufacture three-dimensional objects in an efficient industrial scale. The resulting composites can be finished in various ways, giving surfaces a natural and high-quality design.

## Low emissions

Creating health-compatible living spaces which promote wellbeing is essential for furniture. Our low-emission binders enable your products to contribute to better living comfort. They minimize emission of volatile organic compounds (VOCs) – both during processing and in the final product.

## Lightweight furniture

Lightweight furniture saves resources in manufacturing and reduces transportation costs. No wonder lightweight furniture is becoming popular. Our binders enable the production of innovative components for this future-oriented sector.

\* For further information visit our [acForm® website](https://www.acform.com)



# Solutions for the Construction industry

For more than 50 years, we at BASF have been supporting you in manufacturing advanced construction materials for indoor and outdoor applications in accordance with global market needs.

**Roofing**  
Acronal®, Styrofan®, Saduren®  
Page 19

**Air filtration**  
Acronal®  
Page 15

**Cork flooring**  
Acrodur®  
Page 17

**Masking tapes**  
Acronal®, Styrofan®  
Page 15

**Glas insulation**  
Acrodur®  
Page 13

**Ceiling tiles**  
Acronal®  
On request

**Carpet**  
Acronal®, Styrofan®  
Page 19

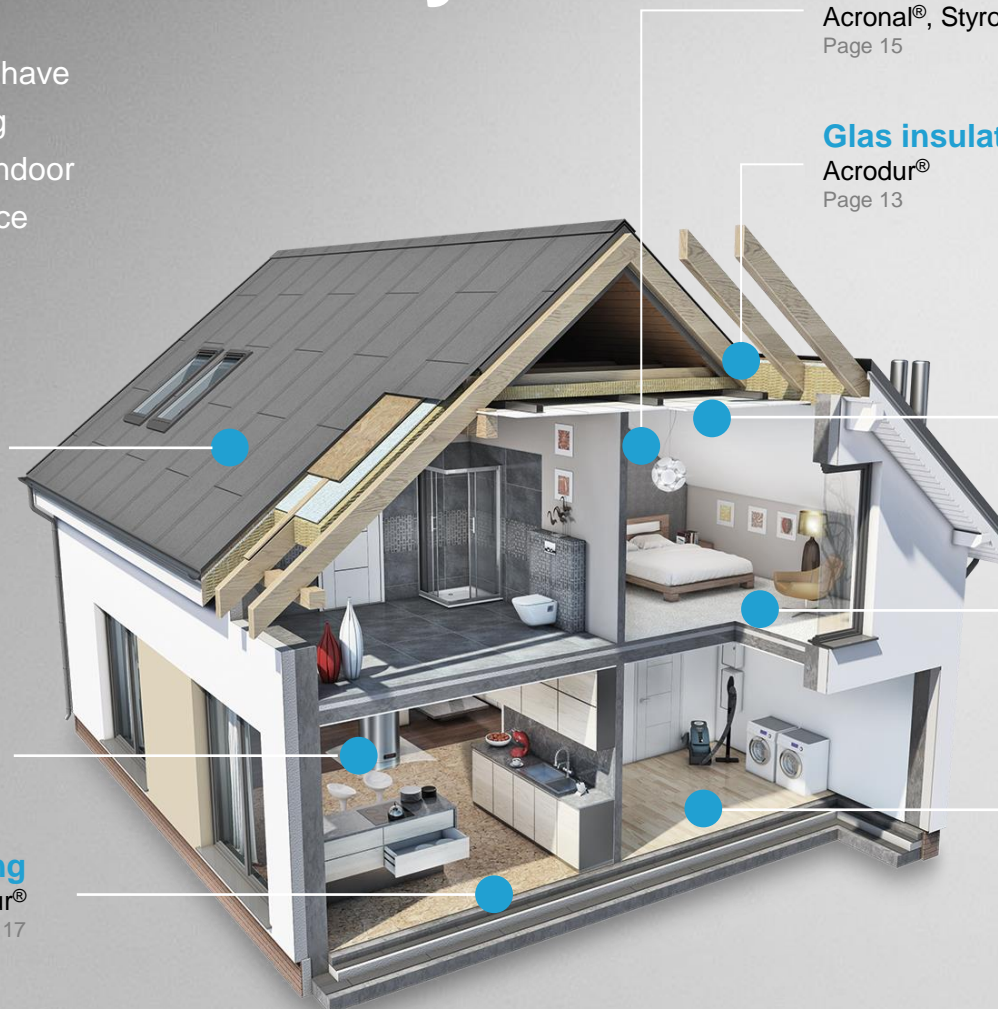
**Vinyl flooring**  
Acrodur®  
Page 19

## More durable materials

Challenging environmental conditions such as heat, frost, humidity and noise require innovative solutions. We support you to meet these challenges with binders providing high mechanical stability and durability for your products.

## Improved indoor air quality

Consumers are looking for safe and health-compatible building materials which contribute to quality of life. With our low-emission binders we enable the production of construction materials which improve indoor air quality.



# Our brands for your success

We offer high-quality binders for a wide range of nonwoven applications. Based on different technologies, they are tailored to our customers' needs. In combination with our additives, they further improve the capability of your formulations.

## ACRONAL®

Acronal products serve as excellent binders for a large range of different fiber types, such as synthetic fibers, glass fibers, natural or cellulose fibers, as well as particles and fillers.

Saduren is an established co-binder to enhance the mechanical performance levels of formulations based on BASF's Acronal or Styrofan dispersions.

## SADUREN®

## ACRODUR®

Our water-based Acrodur products are innovative, low-emission alternatives to conventional formaldehyde-based resins such as phenol, melamine or urea resins.

Styrofan dispersions are an essential component of high-performance nonwovens and your option for cost-efficient and advanced binder technology.

## STYROFAN®

## ADDITIVES®

We offer rheology modifiers (Rheovis®), defoamers (Foamaster®, FoamStar®), wetting agents (Hydropalat®) and dispersants (Dispex®) for a broad range of nonwoven applications.



# Choose your best solution

Our mission is to support you with the right solution according to your specific needs. That is why we introduced a new classification for our binders which provides an orientation with regard to the performance and sustainability properties of our products.

The sustainability criteria of PURE is mandatory for all products marked with PLUS and POWER. All classified products have been evaluated with BASF's Sustainable Solution Steering Method and provide a substantial contribution to sustainability in the specific application.

## POWER

### POWER

Binders providing superior performance compared to existing products and setting the market benchmark. Enables significantly higher value for our customers.

## PLUS

### PLUS

Binders providing additional functionalities and delivering greater value to our customers' products. This helps our customers to save system costs in their value chain.

## PURE

### PURE

Differentiation through ecological progressiveness for more sustainable binder products which show low-emissions and are free of formaldehyde and APEO.

# Worldwide – Close to our customers

In today's global and rapidly changing environment, a global footprint is a key requirement in remaining competitive. It not only allows growth for both sides, but also helps us to better understand your local market needs with regard to research and development, product supply and technical services.





# Product portfolio

Comprehensive solutions from a single source: The BASF portfolio includes advanced products such as aqueous polymer dispersions, resins and formulation additives. All our products are tailored to customer and industry needs.



# Glass fibers

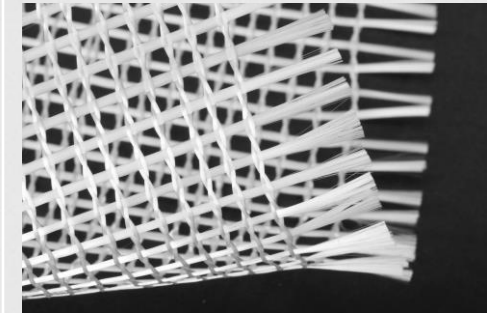
Nonwovens and fabrics based on glass fibers or yarns are widely used in construction applications. Those substrates serve as support layers, as facings and coverings, or as reinforcements. Depending on application and processing requirements, our tailor-made binders ensure that the substrate provides sufficient mechanical performance and attains special resistance to heat, water, solvents or environmental stress.

## Glass fiber Nonwovens



Glass fiber nonwovens are used as support layers for vinyl and carpet flooring tiles or for bituminous roofings. Further applications include robust wall coverings and facing layers for mineral wool mats, construction boards or fiber-reinforced plastic parts.

## Glass yarn Fabrics



Glass yarn fabrics are used as patterned wovens for high-quality wall coverings or as laid or woven meshes for various reinforcing purposes as, e.g. within ETICS applications.



# Glass fibers Product portfolio

Product name	Tg [°C]	Solids [%]	pH value	Viscosity [mPa·s]	Low VOC	FA free*	Self x-linking	Product key properties for respective application
<b>Polymer dispersions</b>								
Acronal® A 420 S	-12	50	~ 5	~ 65	•		•	Hydrophobic, water resistant
Styrofan® 2428	-4	50	~ 7.5	~ 500**	•	•		Alkaline resistant, for glass meshes
Acronal® S 559	-1	50	~ 7	~ 250	•	•		Hydrophilic, "flexibilizer" for Acrodur resins
Acronal® S 560	3	50	~ 8	~ 110	•	•		Hydrophobic, for glass wall coverings
Acronal® Plus 2541	4	52	~ 7.5	170	•	•		Hydrophilic, for glass wall coverings
Styrofan® Pure 2588	7	50	~ 7	~ 230**	•	•		Alkaline resistant, for glass meshes
Acronal® S 720	18	50	~ 8.5	~ 1,100	•	•		Hydrophobic, for glass wall coverings
Acronal® Plus 2483	26	50	~ 8	~ 180	•	•		Hydrophobic, very water and alkaline resistant
Acronal® LN 838 S	29	51	~ 6	~ 40	•		•	Heat and (unpolar) solvent resistant
Acronal® 280 KD	30	40	~ 3	~ 300		•		Cationic, "flexibilizer" for amino resins
Acronal® Pure 2416	38	50	~ 4.5	~ 60	•	•	•	Heat and water resistant
Acronal® S 980 S	44	45	~ 8	~ 70	•		•	Anionic, "flexibilizer" for amino resins
Acronal® A 969	69	40	~ 7.5	~ 20	•	•		Anionic, "hardener" for acrylic dispersions
<b>Acrylic resins</b>								
Acrodur® 950 L	--	50	~ 3.5	~ 1,300**	•	•	•	Very heat resistant
Acrodur® DS 3530	--	50	~ 3.5	~ 250**	•	•	•	Very heat resistant, medium viscosity
Acrodur® Plus 2580	--	59	~ 4	~ 800**	•	•	•	Very heat resistant, high solids content, low yellowing

Tg = Glass transition temperature | Solids [%] = solid content in percent | VOC = Volatile organic compounds | FA = Formaldehyde | Viscosity acc. to ISO 3219 | Low VOC = VOC acc. to 2004/42/EC < 1,000 ppm | self x-linking = crosslinking during drying/heating | \* FA is not intentionally added (product may comprise minor FA traces, as impurities cannot be excluded) | \*\* Viscosity acc. to ISO 2555 ("BROOKFIELD viscosity")

# Cellulose fibers

In nature, cellulose fibers make up the supporting structure of plant cells. Their excellent mechanical properties are particularly useful in finish foils, filtration or wall covering applications. In combination with our binder systems, they help to improve important characteristics such as bonding strength and dimensional stability.

## Automotive filtration



Filters help to protect the engine from various forms of dirt particle. Our systems extend the operating time of your filter by improving durability and dirt filtration efficiency at the same time.

## Finish Foils



Excellent processability and a homogeneous penetration into the paper are important to optimize productivity. Our binders also impress with their strong internal bonding, good print and lacquer characteristics.

## Wall coverings



Nonwoven wall coverings are easy to apply and remove without leaving any traces. Our binders provide dimensional stability, water resistance and internal bonding to your nonwoven wall coverings.



# Cellulose fibers Product portfolio

Product name	Tg [°C]	Solids [%]	pH value	Viscosity [mPa-s]	Low VOC	FA free*	Self x-linking	Product key properties for respective application
<b>Finish foils</b>								
Acronal® Pure 2728	19	50	~ 7	~ 190**	•	•		Medium stiffness
Acronal® S 305 D	23	50	~ 5	~ 90	•		•	Low yellowing, excellent internal bond
Acrodur® DS 3530	--	50	~ 3.5	~ 250**	•	•	•	Acrylic resin, brittle
<b>Automotive filtration</b>								
Acronal® Pure 2416	38	50	~ 4.5	~ 60	•	•	•	Stiff, heat and solvent resistant
Acronal® S 996 S	41	46	~ 6.5	~ 55	•		•	Stiff, heat and solvent resistant
Acrodur® 950 L	--	50	~ 3.5	~ 1,300**	•	•	•	Acrylic resin, can be used as crosslinker
<b>Wall coverings</b>								
Acronal® S 589	2	52	~ 7.5	~ 190	•			Soft handle, low yellowing
Acronal® S 560	3	50	~ 8	~ 110	•	•		Hydrophobic, soft handle
Acronal® Pure 2728	19	50	~ 7	~ 190**	•	•		Medium handle
Acronal® S 305 D	23	50	~ 5	~ 90	•		•	Medium handle, low yellowing
<b>Masking tapes</b>								
Styrofan® 2752 X	- 28	50	~ 7	~ 175**	•	•		For general purpose tapes, very soft
Acronal® 500 D	- 7	50	~ 4	~ 25		•		Soft handle, high tear resistance, UV stable
Styrofan® 2427	- 14	51	~ 8	~ 50	•	•		For general purpose tapes

Tg = Glass transition temperature | Solids [%] = solid content in percent | VOC = Volatile organic compounds | FA = Formaldehyde | Viscosity acc. to ISO 3219 | Low VOC = VOC acc. to 2004/42/EC < 1,000 ppm | self x-linking = crosslinking during drying/heating | \* FA is not intentionally added (product may comprise minor FA traces, as impurities cannot be excluded) | \*\* Viscosity acc. to ISO 2555 ("BROOKFIELD viscosity")

# Natural fibers

Low-emission Acrodur binders are an alternative to formaldehyde-based resins. Composite materials made with Acrodur and natural fibers like hemp, kenaf or wood are lightweight and of high mechanical stability. They are formable in thermoset or thermoplastic processes opening new design opportunities. With our Acrodur grades we are offering innovative and sustainable solutions in particular for the automotive and construction industry.

## Engine encapsulation



Highly efficient combustion engines require state-of-the-art heat insulation. Due to its superior thermomechanical stability, Acrodur is the perfect enabler for turning natural fibers into encapsulation parts. An additional benefit is the acoustic noise reduction. Acrodur can also be applied in other exterior parts, such as underbody shields.

## Interior trim



Automakers are increasingly using natural fibers for lightweight components such as door trims, interior panels, parcel shelves, seat backings and roof frames. The use of natural fibers in combination with Acrodur opens outstanding lightweight performance and new design options for automobile interiors in terms of surface finishing.



# Natural fibers Product portfolio

Product name	Tg [°C]	Solids [%]	pH value	Viscosity [mPa-s]	Low VOC	FA free*	Self x-linking	Product key properties for respective application	
<b>Thermoset</b>									
Acrodur® 950 L	--	50	~ 3.5	~ 1,300**	•	•	•	Hard, brittle	Solution
Acrodur® DS 3530	--	50	~ 3.5	~ 250**	•	•	•	Hard, brittle	Solution
Acrodur® DS 3558	20***	50	~ 3.5	~ 900**	•	•	•	Hard, impact modified	Hybrid
Acrodur® DS 3515	98***	50	~ 3.5	~ 550**	•	•	•	Hard, impact modified	Hybrid

All our thermoset binders are suitable for both wood fibers (blow line impregnation) as well as bast fibers (Foulard impregnation). Resulting prepregs provide a high B-stage stability. Flame retardants and pigments can easily be added to the binders.

## Thermoplastic

Acrodur® Power 2850	85	50	~ 3	~ 100	•	•		Stiff, film formation at room temperature possible	Dispersion
Acrodur® Power 2858	85	50	~ 3	~ 100	•	•		Stiff, reduced water uptake in combination with wood fibers	Dispersion

Our thermoplastic processable binders are suitable for both wood fibers (blow line impregnation) as well as bast fibers (Foulard impregnation). Flame retardants and pigments can easily be added to the binder.

Tg = Glass transition temperature | Solids [%] = solid content in percent | VOC = Volatile organic compounds | FA = Formaldehyde | Viscosity acc. to ISO 3219 | Low VOC = VOC acc. to 2004/42/EC < 1,000 ppm | self x-linking = crosslinking during drying/heating | \* FA is not intentionally added (product may comprise minor FA traces, as impurities cannot be excluded) | \*\* Viscosity acc. to ISO 2555 ("BROOKFIELD viscosity") | \*\*\* Thermoset resin matrix modified with thermoplastic polymer dispersion particles of mentioned Tg

# Synthetic fibers

The demands on nonwoven fabrics made of synthetic fibers are very diverse. Depending on the application, the material must be tear-resistant, weather-resistant, flexible, lightweight, soft or absorbent. Our binders provide the properties needed for your fabrics.

## Roofing



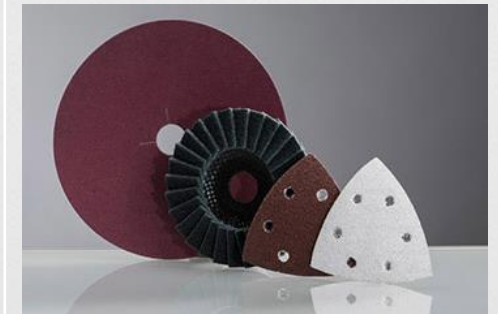
Our formulations provide good thermal resistance to prevent shrinkage during the bituminization process. With our binders and experience we support the development of roofing membranes in line with new standards and legislation.

## Automotive carpet



Whether it's mats or rear seat coverings – automotive carpet requires a high abrasion and water resistance and must be low-odor.

## Abrasives



Our product portfolio for abrasives applications includes oil and solvent-resistant products as well as phenol-compatible products with high thermo-dimensional stability.



# Synthetic fibers

## Product portfolio

Product name	Tg [°C]	Solids [%]	pH value	Viscosity [mPa·s]	Low VOC	FA free*	Self x-linking	Product key properties for respective application
<b>Roofing</b>								
Styrofan® 2430	20	49	~ 5.5	~ 45	•		•	Outstanding thermodimensional stability and elasticity
Styrofan® 2525 X	23	51	~ 7.5	~ 300	•		•	Very good thermodimensional stability
Acronal® S 747 S	23	50	~ 5	~ 90	•		•	Good thermodimensional stability and elasticity
Acronal® S 888 S	28	49.5	~ 8	~ 350			•	Outstanding thermodimensional stability and very good heat resistance
Acronal® 2434 X	32	50	~ 8	~ 100	•		•	Good thermodimensional stability
Saduren® 163	--	70	~ 8.5	~ 650			•	Crosslinking agent
<b>Carpet</b>								
Styrofan® 2427	- 14	51	~ 8	~ 50	•	•		Soft handle
Acronal® S 589	2	52	~ 7.5	~ 190	•	•		Soft handle, low yellowing
Styrofan® 2609	6	53	8	75	•	•		Medium-soft handle
Acronal® Pure 2728	19	50	~ 7	~ 190**	•	•		Medium handle, low odor, good water resistance
Acronal® Pure 2416	38	50	~ 4.5	~ 60	•	•	•	Stiff handle, low odor
<b>Abrasives</b>								
Acronal® 32 D	- 22	50	~ 6	~ 50	•		•	Very good solvent, oil and lubricant resistance
Acrodur® DS 3558	20***	50	~ 3.5	~ 900	•	•	•	Hard, visco-plastic
Acronal® S 888 S	28	49.5	~ 8	~ 350			•	Outstanding thermodimensional stability and very good heat resistance
Acronal® LN 838 S	29	51	~ 6	~ 40	•		•	Very solvent resistant
Styrofan® 2820	33	49	~ 7.5	~ 60			•	Thermodimensional stability
Styrofan® 2800	34	53.5	~ 8.5	~ 150	•	•		Very good compatibility with phenolic resin
Acronal® 12 DE	75	40	~ 6.5	~ 40	•	•		Outstanding oil and lubricant resistancy
Saduren® 163	--	70	~ 8.5	~ 650			•	Crosslinking agent

# Formulation Additives

As a key supplier of additives, we offer a broad range of formulation additives and stabilizers to the nonwovens industry. Only the right combination of additives and binders will result in superior performance for specific fibers. Unique raw materials enable the balancing of properties. They are especially designed to foster more sustainable solutions.

## Rheology modifiers

Adapt low and high shear viscosity of the binder-specific application processes.

## Wetting agents

Reduce surface tension for perfect binder penetration of non-specific fibers and fibrous substrates.

## Defoamers

Prevent or suppress foaming during preparation and processing of binder formulations.

## Dispersants

Allow homogeneous and stable dispersion of fillers, fibers and pigments within binder formulations.





# Formulation Additives

## Product portfolio

Product name	Solids [%]	Chemistry	Properties / Description
<b>Rheology modifiers</b>			
Rheovis® AS 1130	30	Non-associative anionic polyacrylate copolymer (ASE)	For superior anti-settling and sag-resistant properties
Rheovis® AS 1188	60	Non-associative anionic polyacrylate copolymer (ASE)	Stable viscosity independent of the pH
Rheovis® PU 1291	45	Associative hydrophobic modified polyether (HEUR)	Easy handling due to low product viscosity, independent of the pH
Rheovis® VP 1231	30	Vinylpyrrolidone copolymer	Acts as a protective colloid, best performance at pH 5
<b>Wetting agents</b>			
Hydropalat® WE 3110	85	Alkoxylated surfactants	For highly dynamic applications
Hydropalat® WE 3120	> 99.5	Alkoxylated surfactants	For impregnation applications
Hydropalat® WE 3475	75	Sulfosuccinates	Excellent for difficult-to-wet substrates such as polymer, cellulose or glass fibers
Hydropalat® WE 3477	86	Sulfosuccinates	Excellent wetting additive, good foam stabilization for foam application

Solids [%] = solid content in percent

# Formulation Additives

## Product portfolio

Product name	Solids [%]	Chemistry	Properties / Description
<b>Defoamers</b>			
Foamaster® MO NDW	100	Mineral-oil-based defoamers	Effective on synthetic latex containing styrene-butadiene, polyvinyl acetate, acrylics
Foamaster® NO 2331	100	Native-oil-based defoamers	For acrylate-based systems
Foamaster® WO 2323	100	White-oil-based defoamers	Superior defoamer for styrene-acrylate and acrylate systems
FoamStar® ED 2522	~20	Emulsion defoamers	For acrylics, styrene-acrylics and vinylacrylic-emulsions
<b>Dispersants</b>			
Dispex® AA 4030	30	Ammonium polyacrylate (co-)polymer	For low viscous waterborne systems with high fiber load
Dispex® CX 4340	40	Sodium polyacrylate (co-)polymer	For inorganic / hydrophobically modified fibers, i.e. coated glass fibers
Dispex® Ultra FA 4416	75	Mixture of surfactants	Wetting and dispersing agent for aqueous formulations
Dispex® Ultra FA 4420	100	Fatty acid modified emulsifier (FAME)	For dispersing inorganic fibers with high SiO <sub>2</sub> content
Dispex® Ultra FA 4437	> 99	Modified natural oil	Non-ionic wetting and dispersing agent for aqueous formulations, especially designed for organic fiber concentrates

Solids [%] = solid content in percent



# Let's talk

Optimizing performance and sustainability properties of nonwovens is a joint effort. Let's work together in shaping the future.

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We create chemistry